

**R E M A R K S**

The Office Action of June 13, 2002, presents the examination of claims 1-10. Claims 1-10 are canceled. Claims 11-29 are added. Support for claims 11-21 is found in original claims 1-4, support for claims 22 and 23 is found in original claims 5 and 6, respectively. Support for claims 24 and 25 is found in the specification, such as on page 6, line 3 to page 7, line 21. Support for claims 26-29 is found in original claims 7-10. No new matter is inserted into the application.

***Claim Objections***

The Examiner objects to the claims for several informalities, as noted on page 2 of the Office Action. Claims 1-10 are canceled, thus rendering objection to claims 1-10 moot. Applicants submit claims 11-29 which do not contain objectionable errors and are in proper form under 37 C.F.R. § 1.75(c).

***Rejection under 35 U.S.C. § 112, second paragraph***

The Examiner rejects claims 5-10 under 35 U.S.C. § 112, second paragraph for allegedly being indefinite. Claims 5-10 are canceled, thus rendering the rejection moot. Applicants respectfully traverse the rejection if applied to claims 11-29.

Consideration of the claims and withdrawal of the instant rejection are respectfully requested.

Specifically, the Examiner asserts that the recitation of "represented by" in claims 5 and 6 is unclear. This term is not used in claims 11-29, newly added.

Applicants respectfully submit that claims 11-29 fully comply with 35 U.S.C. § 112, second paragraph. Withdrawal of the rejection is therefore respectfully requested.

***Rejection under 35 U.S.C. § 112, first paragraph***

The Examiner rejects claims 1-4 and 7-10 for an alleged lack of written description. The Examiner also rejects claims 1-4 and 7-10 for an alleged lack of enablement by the specification. Claims 1-4 and 7-10 are canceled, thus rendering the rejection moot. Applicants respectfully traverse the rejection if applied to claims 11-29. Consideration of the claims and withdrawal of the instant rejection are respectfully requested.

Specifically, the Examiner asserts that the specification fails to disclose an adequate number of mutant barnase genes to demonstrate that the applicants were in possession of the scope of the claims, and fails to enable one of ordinary skill in the art to make and use the invention commensurate in scope with the claims.

Claims 1-10 have been canceled, and Applicants respectfully submit that claims 11-29 contain subject matter fully described in, and enabled by, the specification such that the claims comply with 35 U.S.C. § 112, first paragraph.

Compared with the nucleotide sequence of SEQ ID NO:1 (the native barnase gene), the nucleotide sequence of SEQ ID NO:3 (the mutant barnase gene) has a T nucleotide insertion at the 15-position. This insertion changes the 9<sup>th</sup> codon in the mutant barnase gene into a termination codon. Therefore, during normal translation, translation will stop at this termination codon and the full-length protein will not be expressed. However, frameshift re-coding occurs during translation of the mutant barnase gene of the present invention, such that the reading frame is restored in part to produce a protein having barnase activity in a smaller quantity.

According to additional experiment as shown in the Declaration under 37 C.F.R. 1.132 attached hereto, the efficiency of the frameshift re-coding in this mutant sequence is about 9%. This percentage is in accordance with the fact that generally, the efficiency of frameshift re-coding is said to be from several percent to 50%, depending on the sequence. Further, according to the additional experiment, this phenomenon was also observed in corn protoplast. Thus, by using the phenomenon of frameshift re-coding,

the expression level of barnase activity can be decreased in not only rice but also in other plants, and barnase expression in plant tissues can be attenuated substantially.

As this effect is the main feature of the present invention, not only the DNA of SEQ ID NO:3 but also its derivatives (as claimed in claims 11, 13, and 14) are claimed in the present application. Also, the insertion of T nucleotide at 15-position described above is believed to be responsible for the mutation which performs the above stated advantageous effect of the present invention. Therefore, the DNA with the insertion of T nucleotide at the 15-position in the nucleotide sequence of SEQ ID NO:1 and its derivatives (as claimed in claims 15, 17, and 18) are also included in the scope of the present invention. Further, the idea of the present invention is that barnase can be attenuated substantially by using the phenomenon of frameshift re-coding, which provides for the great advantageous effect of the present invention. Thus, any DNA that encodes a mutant barnase gene having a mutation relating to the frameshift re-coding and its derivatives (as claimed in claims 19 to 21) are within the scope of the present invention.

A person skilled in the art can easily perform DNA screening to obtain other DNAs having the same effect as the DNA of SEQ ID NO:3, according to the method described in the examples of the

specification. Thus, such other DNAs are sufficiently enabled by the specification. From this point of view, the method of claims 24 and 25 are also claimed.

***Rejection under 35 U.S.C. § 102(a)***

Claims 1-4 and 7-10 are rejected under 35 U.S.C. § 102(a) as being anticipated by WO 98/37211. Claims 1-4 and 7-10 are canceled, thus rendering rejection thereof moot. Applicants respectfully traverse a rejection if applied to claims 11-29. Consideration of the claims and withdrawal of the instant rejection are respectfully requested.

In order to overcome this rejection, Applicants submit herewith a certified English translation of the Japanese priority application, JP220060, along with a verification of translation by the translator thereof. The requirements of 37 C.F.R. § 1.55 are therefore met, and WO 98/37211 is removed as prior art against the present application. Withdrawal of the instant rejection is respectfully requested.

***Rejection under 35 U.S.C. § 102(b)***

Claims 1-4 and 7-10 are rejected under 35 U.S.C. § 102(b) as being anticipated by WO 96/26283. Claims 1 and 3 are rejected under

35 U.S.C. § 102(b) as being anticipated by Serrano et al., and claims 1 and 3 are rejected under 35 U.S.C. § 102(b) as being anticipated by Jucovic et al.

Claims 1-4 and 7-10 are canceled, thus rendering rejection thereof moot. Applicants respectfully traverse a rejection if applied to claims 11-29. Consideration of the claims and withdrawal of the instant rejection are respectfully requested.

The rejection was based on the fact that former claim 1 did not recite a sequence identifying number. Claims 11-29 recite SEQ ID NOs: 1, 2, or 3. Thus, the instant rejection is overcome.

***Rejection under 35 U.S.C. § 103(a)***

Claims 1-4 and 7-10 are rejected under 35 U.S.C. § 103(a) as being obvious over WO '283 combined with Serrano et al. and Jucovic et al. Claims 1-4 and 7-10 are canceled, thus rendering rejection thereof moot. Applicants respectfully traverse a rejection if applied to claims 11-29. Consideration of the claims and withdrawal of the instant rejection are respectfully requested.

Applicants respectfully submit that the combination of references does not make the present invention obvious. The cited references are all based on the idea that a mutation in the barnase gene will decrease the activity of barnase itself. In contrast, the

present invention is based on the idea of decreasing the expression level of barnase by using the frameshift re-coding, thus attenuating the barnase activity in plant tissues. Therefore, the ideas underlying the inventions are fundamentally different. In addition, a method to produce male sterile plants by using the attenuation by way of frameshift re-coding is not suggested in any of the cited references. Therefore, none of the cited references, either alone or in combination, make the present invention obvious.

**Summary**

Applicants respectfully submit that the rejections of record have been overcome and the instant claims recite patentable subject matter such that the present application should be placed into condition for allowance. Early and favorable action on the merits is therefore respectfully requested.

Attached hereto is a marked up version showing the changes made to the application by this Amendment.

If the Examiner has any questions concerning this application, the Examiner is requested to contact Kristi L. Rupert, Ph.D. (Reg. No. 45,702) at (703) 205-8000.

Pursuant to the provisions of 37 C.F.R. §§ 1.17 and 1.136(a), the Applicants hereby petition for an extension of two (2) months to

Application No. 09/509,945

November 13, 2002, in which to file a reply to the Office Action.  
The required fee of \$400.00 is enclosed herewith.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully Submitted:

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Attachment: Claim Version with Markings to Show Changes Made  
Verified Translation of Priority Document  
Declaration under 37 C.F.R. 1.132



**Claim Version with Markings to Show Changes Made**

**In the claims:**

Claims 1-10 are canceled.

Claims 11-29 are added.